

NEW BEES AND WASPS—PART XIII*Analastoroides*, A New Genus of Wasp-like Bees

By TARLTON RAYMENT, F.R.Z.S.

DIVISION COLLETIFORMES

Family *Hylaeidae*, Subfamily *Hylaeoidinae*Genus *ANALASTOROIDES*, gen. nov.

Slender black and red almost naked bees, about 11 mm. in length, closely resembling *Alastorid* wasps, and almost perfectly "mimicking" bees in the genus *Hylaeoides*, but bands of the abdomen are formed of red hair; tegument is not coloured. (Genotype: *A. foveata*, sp. nov.)

Head transverse, with yellow marks on face; facial foveae conspicuous; scapes inserted above middle of face; mandibulae bidentate; labrum a wide oval, with a large median ridge and nodule; four segments in the labial palpus and six in the maxillary palpus; glossa short, wide, and deeply emarginate; paraglossae large; genae well developed.

Prothoracic collar reaching tubercles laterally. Thorax ovate; scutellum large; no elevated area on metathorax.

Abdomen slender, long-ovate, marked with red fasciae of microscopic hair; sternites all simple, without the channel, nodule, and yellowish tegumentary band of *Hylaeoides*.

Legs slender, almost nude, the anterior pair lacking the apical hooks of *Hylaeoides*; hind calcaria finely serrate; strigilis with a spined malus, and a narrow velum; anterior and posterior coxae large and subtriangular.

Wings long, deeply suffused with blackish-purple; nervures strong, radius pointed off the costa, the large second cubital cell receives both recurrents, the second at its posterior fourth, basal not quite straight; pterostigma large; eleven hamuli unevenly spaced. A white line runs from the pterostigma through the cubital cells as in *Halictus peraustralis* Ckll.

Male not known.

Type locality: Jameroo, New South Wales.

ANALASTOROIDES FOVEATA, sp. nov.

TYPE Female—Length 10.5 mm., approximately. Black, with a band of red hair.

Head transverse, bright, a few silvery hairs of microscopic plumosity; face with two large suboval lateral primrose-yellow marks; frons with close, large pyriform punctures; clypeus black, finely aciculate; supraclypeal area elevated, with a fine sulcus that reaches the median ocellus; vertex closely punctured, facial foveae incurving to reach the lateral ocelli as a deep pit; compound eyes

large, converging slightly below; genae well developed, with many large punctures on a lineate sculpture; labrum a wide oval, with a median ridge and a large nodule; mandibulae bidentate, rather short, a few yellowish hairs; antennae black, scape slender.

Prothorax heavy, reaching the tegulae laterally, black; tubercles black; mesothorax all black, excessively closely punctured, practically nude, appearing almost granular; scutellum similar, but anteriorly the puncturing is closer and minute; postscutellum so closely punctured as to appear granular; metathorax with a large enclosed area finely granular; laterally there are a few pale plumose hairs; abdominal dorsal segments black, excessively closely punctured, with numerous appressed black hairs; one and three each with a broad transverse fascia of short moss-like red hair; four to six with straw-coloured hair; ventral segments shining, many punctures, nude, simple.

Legs black, slender, the femora basally and tibiae red, with a few short white hairs; tarsi all of the same width, on the anterior legs the long stiff pale hairs are hooked, as in *Hylaeoides*; claws bifid, reddish; hind calcar finely serrated, amber; tegulae black, with a fringe of white hair.

Wings long, deeply infuscated with iridescent purplish-black; nervures strong, black; the large second cubital cell receiving both recurrent nervures; pterostigma large and black; hamuli unevenly spaced, eleven in number.

Type locality: Jamberoo, New South Wales (alt. 1,600 feet), January 22, 1949; also January, 1950. *Leg.* Norman W. Rodd. GENOTYPE in the collection of the author.

Aliases: *Hylaeoides concinna* Fab., which has abdominal bands of tegumentary colour, with the anterior tibiae armed with large, strong hooks.

On both occasions the females were taken on flowers of *Leptospermum flavescens* var. *grandiflorum*, but no males were observed by the collector.

DISCUSSION

Could mimicry do more?

This new bee (*Analostoroides foveata*), another known as *Hylaeoides concinna* Fab., and several wasps in the genus *Alastor*, present one of the most remarkable parallels in the insect world. "Mimicry" is often responsible for this phenomenon, but it is surely a misnomer, for it connotes the conscious imitation of a model.

All the insects are feverishly active on hot days; all are of about the same size and slender build; the body-colour is dull black, and the abdomen is ornamented with a spectacular sash of orange-red in brilliant contrast; the "face" has a butter-coloured mark or marks, and the wings are suffused with iridescent blackish-purple.

The insects are almost nude, for the student has to examine them under the microscope before any plumosity can be identified with certainty. None has the equipment for carrying a harvest from the flowers; consequently, the bees have to sweep the pollen into the mouth with the peculiar hooked hairs of the front legs, and carry it home in the honey-sac.

The Alastorid wasps alight on the surface-film of deep water, and take off from it without difficulty. They carry dry earth, and water to moisten the building bricks. The cells are provisioned with small green caterpillars. The red abdominal sash is tegumentary. (For a full account of the biology see *Wild Life*, June, 1940.)

The other bee, *Hylaeoides concinna*, has a similar tegumentary red band on the abdomen, but the shin of the foreleg is armed with a large strong hook. The females construct diaphanous skin cells in plant-tubes, and harvest a store of honey and pollen for their young. The "doorway" is always camouflaged with a delicate "iris" of silk which opens and closes perfectly for the passage of the bee. (A full account of the biology is also given in *Wild Life*.)

The new bee, *Analastoroides foveata*, will readily be confused with that described above, for its flaming red sash is a perfect match, but the colour is in the tegument; surprisingly enough, it is due entirely to hair. There are no hooks on the front shins. The male and the biology of this remarkable bee are unknown.

It is difficult to refrain from postulating that these wasps and the bees had a common ancestor. *Hylaeoides* has a pale band across the belly, but the colour is tegumentary. *Analastoroides* also has a light band, but again it is due to pale hair. Indeed, it would seem that one must be a mutation derived from the other.

Since plumose hairs are the hall-mark of bees the world over, then one postulates that *Hylaeoides* is a mutation that has lost its hair; the hooked shin of the forelegs is certainly a primitive wasp-like character.

The likeness is not merely a superficial one, due to general form and colour, but may be detected in such minutiae as the pattern of the "skin," the thumb-prints, the sculpturing of the black tegument, the slender almost nude legs, the yellow markings on the face and the ventral band.

The several alastorid wasps found in the six States vary in colour, some have ivory-yellow markings, but a *Hylaeoides* also is present, with similar markings. Wherever the alastorids exhibit a difference in colour, the local species of *Hylaeoides* will surely show a corresponding colour scheme.

Certain naturalists claim that the palatable species of insects "mimic" the spectacular garb of the distasteful or dangerous ones, and so escape attacks by insectivorous birds. The alastorid wasps may have a disgusting flavour, and the "disguise" of warning

colours worn by the two bees may afford the honey-gatherers a perfect immunity, but it is difficult to appreciate the necessity for including such microscopical details as the "thumb-prints of the skin" for the perfecting of the disguise. If this interpretation of the observed facts be true, then we have a striking example of Müllerian "mimicry," with the flavoursome "mimic" coloured exactly like the distasteful "model."

Batesian "mimicry" may also be involved—the striking contrast of cinnabar and black being a conspicuous warning to all predators to "keep off the propellers." However, here are the facts; their interpretation is left to the reader.

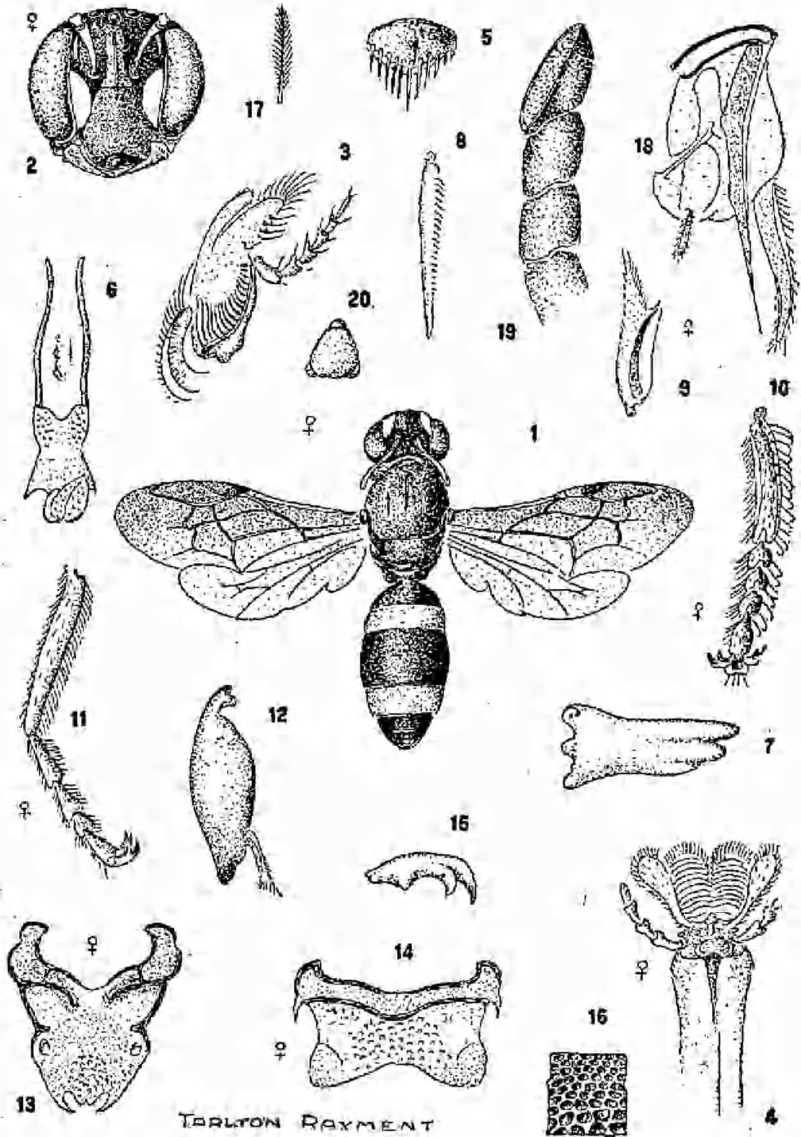
So far as the author has been able to ascertain, there is no record in the literature of the group on physiological "camouflage" in bees, and he was, therefore, somewhat surprised when two students of nature at Black Rock, Victoria, reported that a change of colour takes place in the facial hair of *Paracolletes fervidus* Ckll.

The males have the front of the head-capsule heavily masked with a "mat" of long plumose straw-coloured hair that gleams with the lustre of very shining satin. It is a conspicuous feature that can be observed in an aperture ten feet away, for the circle of the head-capsule, filling any aperture, has the iridescence of a jewel.

These males are remarkable for their habit of sheltering in any available gallery: in a tree, a piece of firewood, a cavity in a brick wall; the Rush brothers actually discovered a male sheltering in the shackle of a spring on an auto-truck, and the bees returned to the same shelter, night after night, for about two months, viz., January and February. These observers found that if a finger be passed over the aperture of the gallery, the satiny yellow of the "face" fades to a dull grey-brown, which renders the insect much less conspicuous in its retreat. They reported that the change of colour is not instantaneous, but develops as a gradual darkening of the hair; nor does the phenomenon disappear suddenly, but rather progressively diminishes, until it finally fades out entirely.

The pigment of the majority of bees is melanin, usually of black, brown or yellow colour, and produced from the amino-acid tyrosine, which results from the action of the enzyme tyrosinase. These actions are brought about during the digestion of protein. The author was able to show that the change in the colour of the bee's hair was not due to melanopores, but to the incidence of light-waves on the numerous hairs.

It should be noted that the phenomenon was observed only in the late afternoon, when the sun was too low to light the apertures, which invariably have an eastern, northern or western aspect, but never a southern one. During the day the bees are absent in the field, and their activities while abroad are unknown, for the "nests" have yet to be discovered.



For explanation, see page 25.

The Rush brothers described the males as being ready to put up a stout front, and a brave defence, sallying from the shelter with a warning buzz to begone. If a twig be inserted in the tube, the male will bite at it pugnaciously, and may even be drawn from the shelter without relaxing his hold.

EXPLANATION OF PLATE

1. Adult female *Analastoroides foveata* Raym.; legs not shown. 2. Front of head-capsule. 3. Maxilla with large comb and palpus. 4. Glossa and paraglossae. 5. Labrum. 6. Pharyngeal plate. 7. Mandible. 8. Hind calcar. 9. Strigilis. 10. Anterior tarsi. 11. Posterior tarsi. 12. Anterior tibia; note absence of the distal hook. 13. Seventh abdominal sternum. 14. Sixth sternum. 15. Tarsal claw. 16. Sculpture of the scutellum. 17. A tiny plumose hair from abdominal fascia. 18. Sting and gonostylus. 19. Apical segment of flagellum. 20. Myrtaceous pollen-grain taken from abdomen.

EXCURSION TO TRENTHAM

The "Fungus Foray" on April 1, while bringing to light no important discoveries, proved an enjoyable outing for nine members who undertook the journey. A two-mile walk from Trentham Station to the Coliban Falls seemed no distance, through admiration of the numerous magnificent eucalypt specimens lining the road, particularly the Manna Gum (*Eucalyptus viminalis*).

The first fungus collected was *Psalliota campestris*, the common mushroom, but we are afraid the specimens were not used entirely for scientific purposes! The "Fairy Ring" fungus, *Marasmius oreades*, was frequently seen by the roadside, and several definite rings could be traced. The stately Parasol Fungus, *Lepiota gracilentata*, was also fairly common; the elegance and symmetry of this species, and of *L. cristata*, attracted the attention of all, and one excursionist plucked up sufficient courage to eat a sample of the former "Parasol."

Blue Pixies' Parasol, *Mycena interrupta*, and the brilliantly red *Mycena viscido-eruenta* were added to our list; then came *Collybia radicata*, of which we were able to examine the long rooting "shank," *Russula omica*, *Laccaria laccata*, and *Lactarius deliciosus*. These were the principal agarics, the more noteworthy of other fungi being the beautiful rosulate *Stroemium elegans* and little gelatinous *Heterotextus pezizaeformis* on damp logs and sticks.

Blanket Fern (*Pleurosorus rutifolius*) was found in several rock crevices near the Falls, and Clustered Everlasting (*Helichrysum semipapposum*) was still in flower.

R. D. LEE.

ANNIVERSARY FUNCTION

The July meeting of the Club, coinciding with the 70th Anniversary, will take the form of a special function at the Scots Church Hall on Thursday, 13th July, at 7.45 p.m. Full details will be announced in the July *Naturalist*.